



## Biogas next frontier: Global drivers, local challenges

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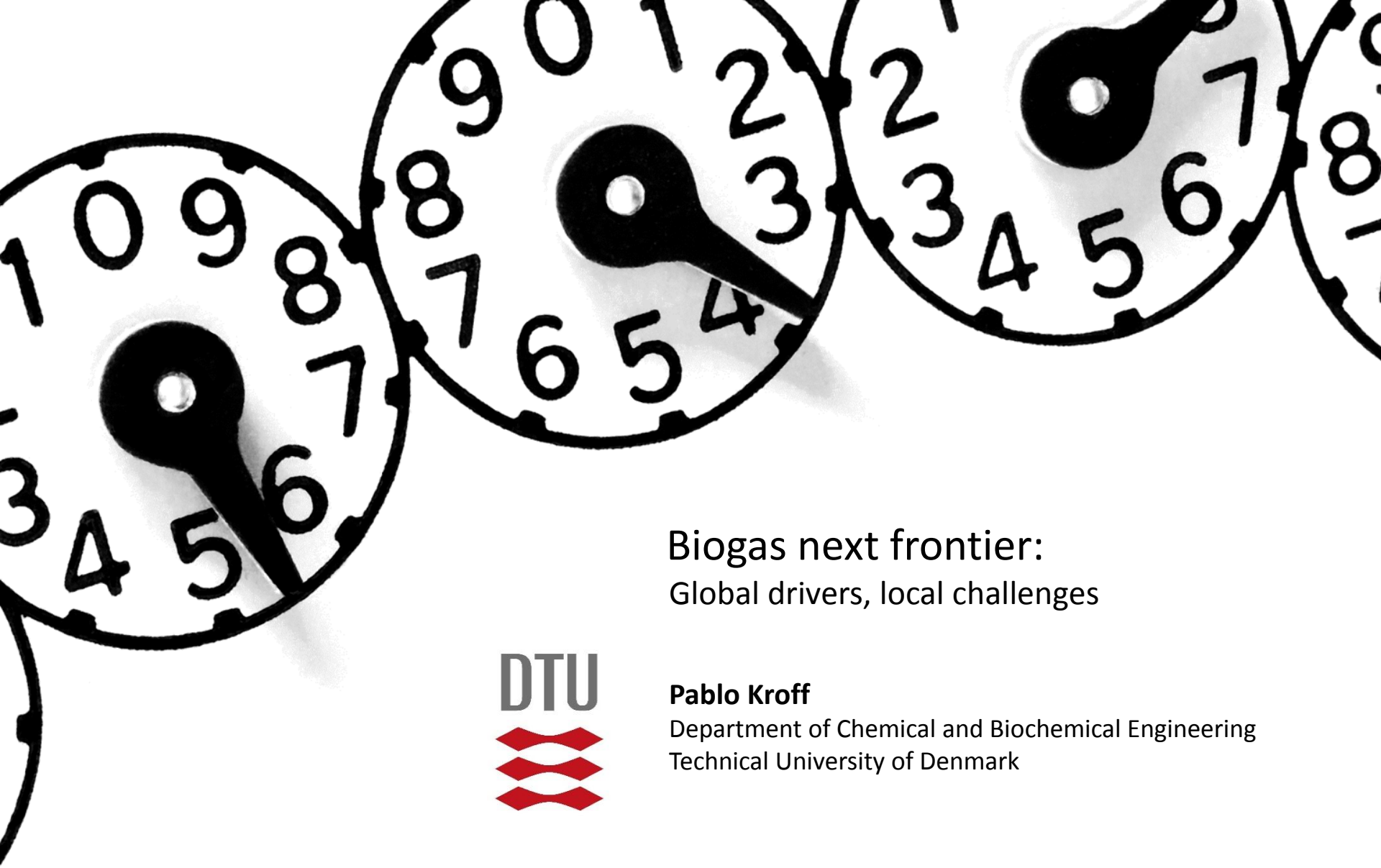
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## Biogas next frontier: Global drivers, local challenges



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11th September 2013. Lyngby, Denmark

## **OBJECTIVES**

- Give an overview about the path of biogas and its current state of challenges;
- Show the main coordinates that define anaerobic digestion as a key process towards a sustainable future;
- Generate awareness about the strategic need of systemic approaches to overcome barriers and challenges;
- Identify important tendencies and patterns for the future of the anaerobic digestion process both at technological and research levels.



Objectives

About us and the context of our analysis

Biogas frontiers today

A new perception for an integrated vision: Sustainability, not renewability

Conclusions

Final remarks

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## ABOUT US



H.C. Ørsted, the man who discovered electromagnetism, founded in 1829 “Den Polytekniske Læreanstalt” now known as DTU - Technical University of Denmark.

Technical University of Denmark







DTU

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Google





Denmark.





Copenhagen.





The future.







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## CONTEXT OF OUR ANALYSIS

SEARCH



CONTACT

PRESS

NEWSROOM

EVENTS

TOURS

ABOUT

**State of Green**   
Join the Future. Think Denmark

Denmark is leading the transition to a **green**  
growth economy and will be fossil free by **2050**

[Read more >](#)

Intelligent Energy

Energy Efficiency

Heating &  
Cooling


Water

Bioenergy

Wind Power

Solar & Other  
Renewables

Resources &  
Environment

A black and white photograph of Mario Molina, an older man with glasses and a beard, speaking at a podium. He is wearing a suit and tie. A microphone is visible in front of him. The background is dark and out of focus.

"It is too late to stop climate change. Our efforts need to be focused on mitigation activities."

*Mario Molina, Copenhagen, June 2012.*

## **CONTEXT OF OUR ANALYSIS**

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BIOGAS IS NO LONGER THE SUB-PRODUCT OF WASTEWATER  
TREATMENT AND/OR AGRICULTURAL ACTIVITY, BUT A  
STANDALONE SOURCE OF VALUABLE RENEWABLE ENERGY.









erdgas  
mit Erdgas Auto fahren



3

weiter Standort  
im Ch

Erdgas  
5  
kg / kg  
GTS / kg

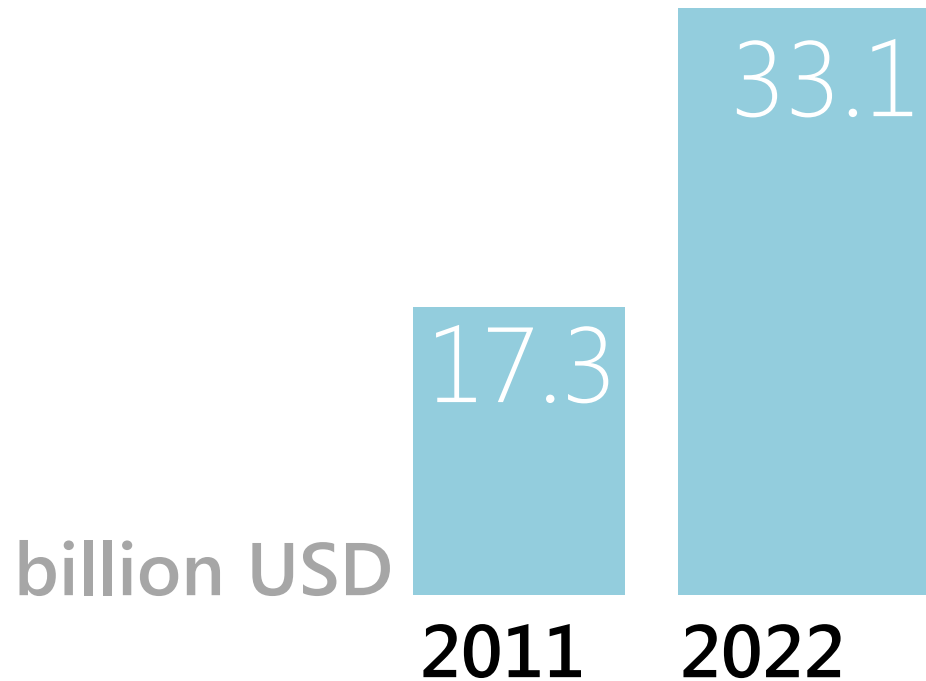


erdgas  
biogas  
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280ZR  
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Mercedes-Benz Roma

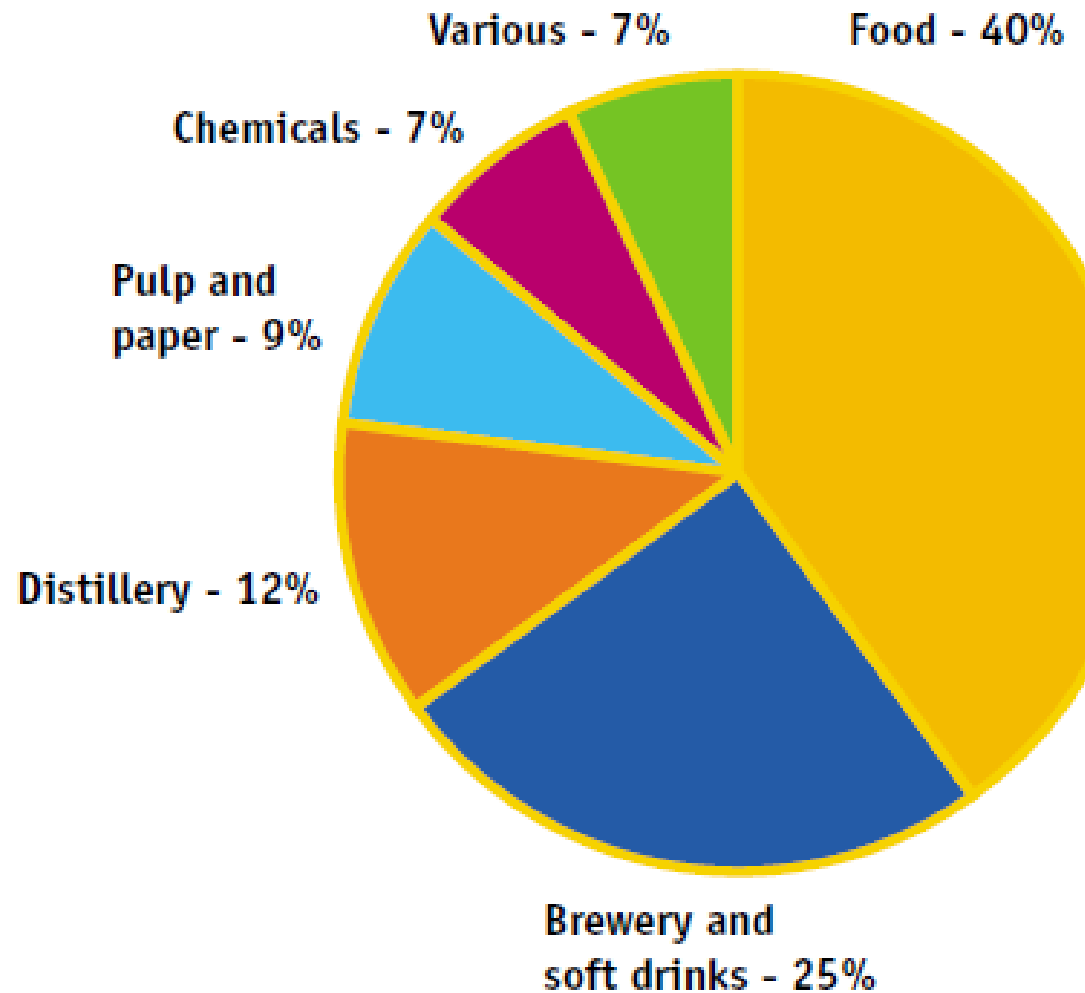
## CONTEXT OF OUR ANALYSIS

The global biogas market is growing fast

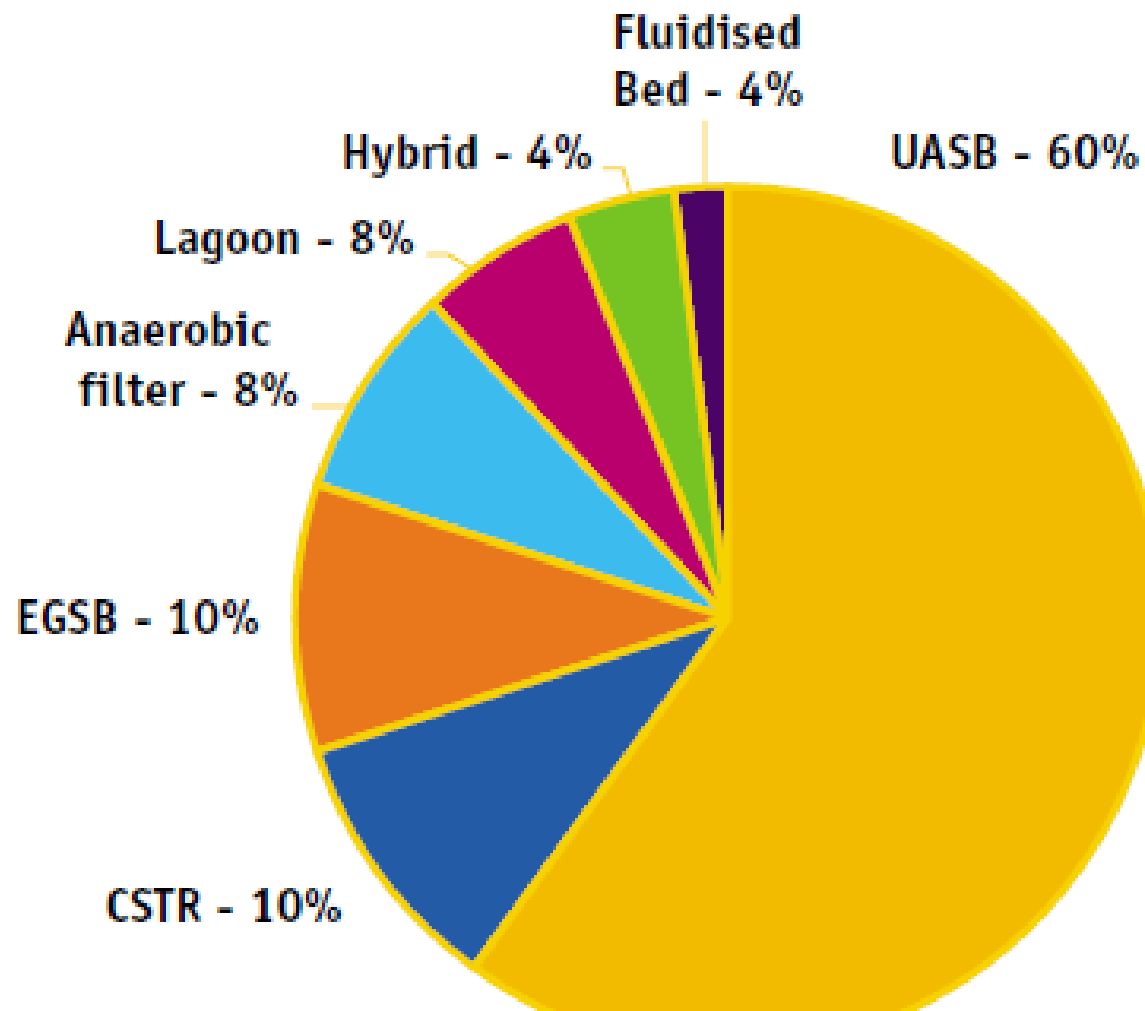




## CONTEXT OF OUR ANALYSIS



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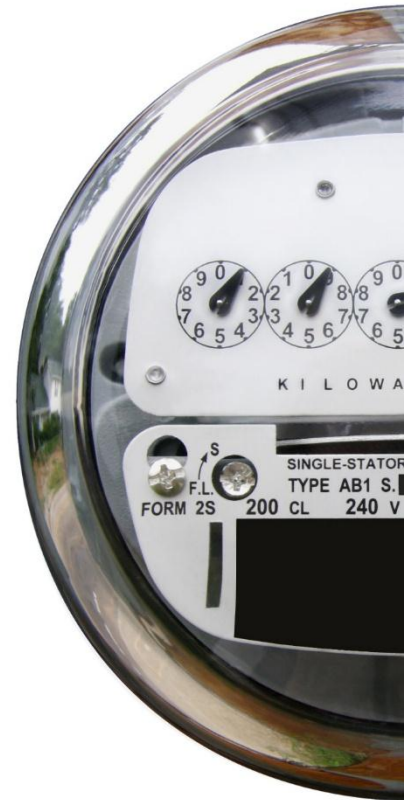
Final remarks



## BIOGAS FRONTIERS TODAY

Researchers, governments and businesses are currently engaged in a massive game of catch-up with objectives (like 2020) that show a high opacity in terms of real outcomes, and are not always in line with their local realities or their local futures.

1. Description-centered, symptom-focused research;
2. Technology as a shield against the lack of understanding;
3. Underestimation of the complexity and the real need of deep understanding of phenomena.



## **BIOGAS FRONTIERS TODAY**

- Which business models are the ones that present the highest benefit to society?
- There is currently limited use of biomethane in either the gas grid or as a transport fuel, how are the stakeholders going to address this situation together?
- There is a need to fully comprehend the competing priorities of land use, environment and biodiversity and the interconnection with feedstocks for on-farm AD plants.

## **BIOGAS FRONTIERS TODAY**

- Which are the driving metabolic forces behind resilient AD processes in intensive co-digestion schemes?
- Which are the key enzymes that should be enhanced?
- What kind of cell/molecular interaction can be modified in order to achieve superior stability in AD processes?
- Are highest yields also optimal yields?



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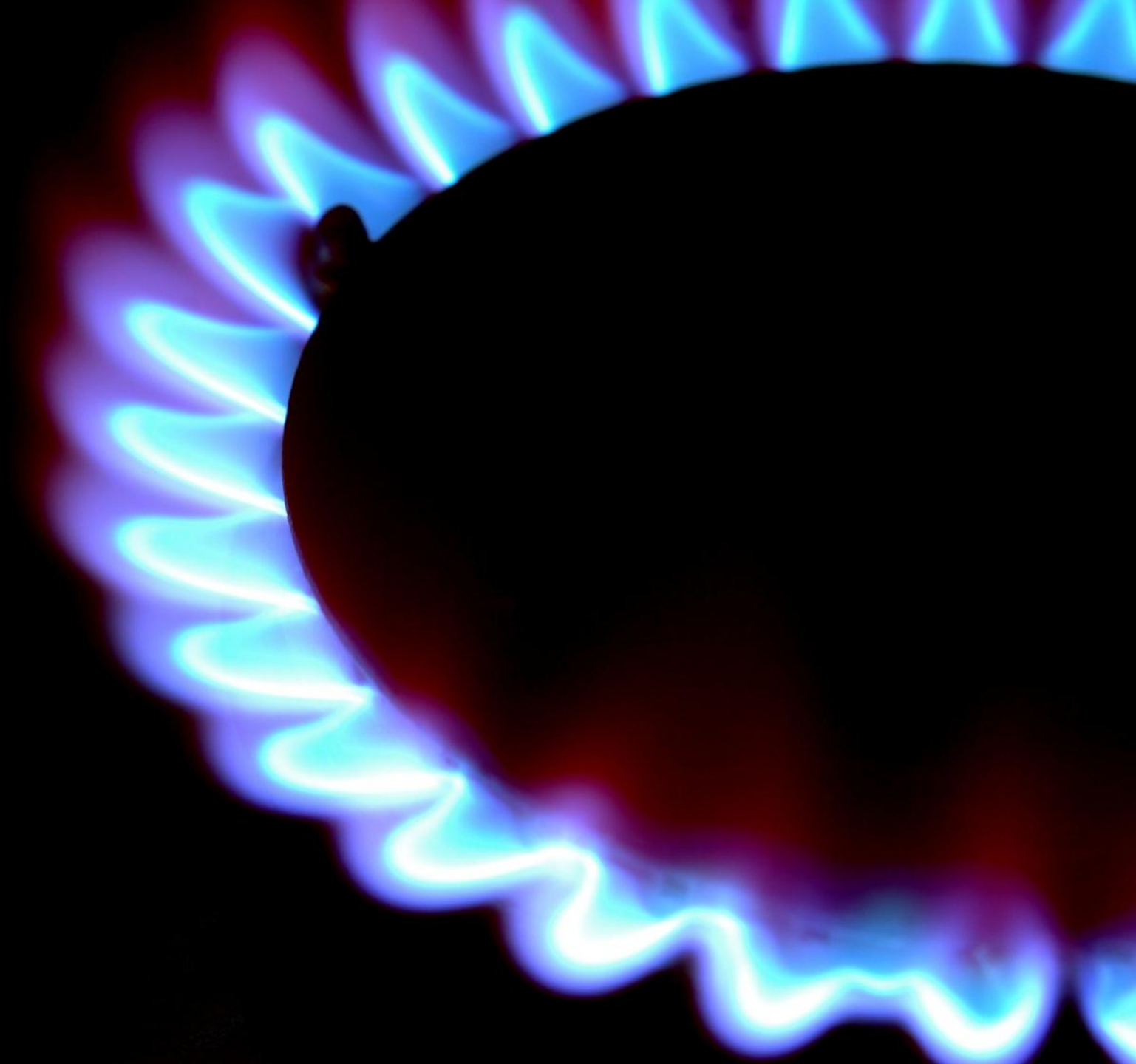
## **A NEW PERCEPTION FOR AN INTEGRATED VISION**

- 1 WASTEWATER TREATMENT
- 2 SLUDGE STABILIZATION
- 3 ENERGY PRODUCTION
- 4 SUSTAINABILITY

Historic segmentation of biogas development and perception in public and private sectors in the last 30 years.















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## **A NEW PERCEPTION FOR AN INTEGRATED VISION**

- 1 CLIMATE CHANGE
- 2 SYSTEM BIOLOGY: metagenomics
- 3 BIOECONOMY: CO<sub>2</sub>, food, water
- 4 SPECIFIC TECHNICAL DEV: enzyme tech

Four strategic areas for  
the future of biogas.



## **SOLRØD PROJECT**

Collaboration between the municipality of Solrød, Denmark and KT.

Co-digestion of pectin production residues, manure and seaweed for biogas production.

TARGET: reduction of carbon footprint, increase in efficiency, decrease dependency





## ARCTIC PROJECT

PhD project assessing pros and contras of methanation of organic waste in Greenland.

Co-digestion of organic fraction of waste from different sources in Greenland. Analysis of novel microbiologic activity and populations interactions.

TARGET: set a new level of understanding about AD processes in extreme environments.





## BIOGRASS PROJECT

Assessment of optimum balance for carbon and nutrients cycles.

Co-digestión of manure and increasing levels of grass to address impact on biogas production and of slurries in agriculture.

TARGET: analyze sustainability of biogas production to extract insights about stakeholders interaction into a bioeconomy framework.





## GHANA PROJECT

DANIDA funded collaborative research project in Ghana.

Mapping of biomasses and assessment of sustainable production of biofuels.

TARGET: Understand local drivers and constraints of the production of biofuels, including specific low tech developments.





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## CONCLUSIONS

Anaerobic Digestion is a flexible technology that is applicable in different scales and allows society to be more resource-efficient, decoupling economic growth and the use of resources, supporting economic growth for under-developed countries and improving quality of life for all.



## CONCLUSIONS

Biogas must be part of the society's response to the challenge of reverting climate change problems. Anaerobic digestion reduces the GHGs in two ways. First, and the most important, by capturing biogas, and second producing biogas to replace fossil fuels.



## CONCLUSIONS

The need of dissection of current processes and knowledge towards a deeper understanding on interactions and function, in order to fulfil the need of getting regional, getting local, getting tactical.



## CONCLUSIONS

The systemic approach, allows developing more ambitious anaerobic projects and considers conditions and trends in systems and services, trade-offs for human well-being, towards the development of a bioeconomy and its fundamental, and unavoidable, implications for the future .





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